racter of *Truncatella* applies to only one species, and is therefore partial, untenable, and contrary to authorities.

We now come to a later epoch, when malacology has furnished an essential generic character for *Truncatella* which no other British mollusk has yet been found to possess, that is, the immersion of the eyes in the tissue (instead of being placed on pedicles as is usually stated) at the superior and nearly terminal points of the short, strong, divergent, almost rectangular tentacula: this structure stamps the so-called *A. Grayana* a *Truncatella*, and is that of every other British species of the genus.

Dr. Gray then terminates his reasoning with a malacological observation, that I have described the *Truncatellæ* of my work on the British Marine Testaceous Mollusca as having a white iris (? pupil), and that I had not observed in *A. Grayana* a similar appearance, on which account he seems to throw a doubt of its being a *Truncatella*. I do not understand the logic of this; the point in question is a mere specialty; one may with as much reason say that a man with a red iris or pupil, for example an *albino*, is not of the genus Man, because he has not the usual dark or grey iris; so, it is equally absurd to infer that *A. Grayana* is not a *Truncatella*, because the white iris or pupil was not detected.

Dr. Gray concludes by stating, that my notions are not those usually held by modern zoologists, and pronounces the whole of my logic unsound. I am not surprised that my logic should not find favour with one who considers that a genus must be restricted in the number of its species, however similar these may be in every essential character; and am sorry to learn, on Dr. Gray's authority, that such notions are held by modern zoologists, of which I was not before aware.

I am, Gentlemen,
Your most obedient Servant,
William Clark.

XXVI.—*On the Morphology of the Organs called Lenticels.* By M. E. Germain de Saint-Pierre*.

The name of *lenticular glands* was given by Guettard, and that of *lenticels* by P. DeCandolle, to certain organs belonging to the bark of a great number of plants, which appear at the surface of the epidermis in the form of little brownish elevations or rugosities of an oval or elliptical form.

* From the Comptes Rendus, August 20, 1855, p. 305.

The opinion of Guettard (1734) that these organs formed an apparatus of secretion, was combated by DeCandolle (1826), who, as well as E. Meyer, believed that the lenticels were the rudiments of the adventitious roots. M. Hugo Mohl in his turn (1832–1836) has shown that DeCandolle's opinion was ill-founded, and ascertained that the production of the lenticels is analogous to that of cork, with this difference, that cork is the result of the hypertrophy of the suberose layer of the bark, and that the lenticels are produced by the hypertrophy of a deeper layer, the herbaceous layer. Lastly, M. Unger (1836) thought he recognized a sort of analogy between the lenticels and the *soridia* of the Cryptogamia, the utricles of cellular tissue which constitute the corky mass of the lenticel appearing to him to be analogous with the spores or propagula. The same observer regarded the lenticels as the result of a deformation of the *stomata*; and Du Petit-Thouars, who had given an analogous opinion, considered them to be intended for effecting a sort of communication between the external air and the cellular or amylaceous layer of the bark. The great diversity of opinion in so many distinguished observers, regarding a structure apparently so simple and so accessible to study, determined me to undertake some new researches, a summary of which I laid before the Société Philomatique in 1849; I have since continued my series of observations upon this subject, and now lay the results before the Academy. I have chosen for the subjects of my observations three trees in which the lenticels present essential differences of form,—namely the Birch (*Betula alba*), the Elder (*Sambucus nigra*), and the suberose variety of the Elm (*Ulmus campestris*).

In the Birch the first state of the lenticel is an epidermic gland of very simple structure. During its period of vitality (on the young branch) this gland secretes a gummy resinous matter; it then dries, splits up and becomes destroyed, leaving in its place a brownish fissure through which the subjacent cellular tissue protrudes. It is this cellular tissue which constitutes the adult lenticel, and M. Unger, who examined these glands, did not follow their development as far as the true lenticular period. In this particular case, it cannot be denied that the name of *lenticular glands* applied by Guettard to the lenticels is correct; but it can only apply at the period when the preparatory organ of the lenticel exists alone, and when the lenticellar mass does not yet exist.

On the epidermis of very young branches of the Elder, we may observe stomata and epidermic elevations or short hairs with broad bases. The stomata do not undergo any ulterior change of form; they are merely obliterated in proportion as the

epidermis dries and grow old; but I have never seen them pass to the state of lenticels. On the other hand, in the short hairs already mentioned, and which are, properly speaking, elevations or pouches of the epidermis, the following facts may be observed: the upper part of the short hair, or the centre of the obtuse epidermic process, dries up and becomes destroyed at a certain time, and there soon remains nothing but the base, which is of an oval or elliptical form, and the margins of which are composed of a delicate membrane with lacerated edges; in place of the hair a narrow fissure only is then seen. It is through this fissure that the eruption of subepidermic cellular tissue of which the adult lenticel is composed, takes place; the quantity of cellular tissue protruded soon enlarges the original fissure by tearing it, and the origin of the lenticel is no longer recognizable; subsequently the increase in the length and diameter of the branch and the consequent distension of the epidermis become fresh causes of deformation, and the lenticel, after having been torn in a vertical direction, becomes enlarged horizontally. The cellular mass of suberose appearance which protrudes through the epidermic fissure in the form of a double cushion, and of which the outer layer becomes brownish by desiccation, appears to me to be composed, not of the herbaceous, or deep cellular layer, but of the suberose or subepidermic cellular layer.

In the suberose variety of the Elm, the first development of the lenticels takes place as in the Elder, but the excessive hypertrophy of the subepidermic cellular tissue soon disguises its lenticellar origin. In this tree I have followed all the transitions between the first elevation of the epidermis, the lenticellar hernia, and the corky masses which afterwards cover the bark with their anastomosing channels. In this tree, as in the preceding, numerous microscopic preparations have always showed me a perfect continuity between the lenticellar hernia and the suberose layer of the bark, with this difference, that in consequence of the direction of the expansion, the cells of the protruded portion are perpendicular to the bark instead of being parallel to it, as in the normal suberose layer.

From these observations it results that I regard the lenticels not only as a formation analogous to cork, but as one completely identical in origin and in tissue: the difference between the two productions consists only in the intensity of the hypertrophy, which is generally feeble in the production of lenticels and very intense in that of cork, which is nothing but exaggerated lenticellar production.

The maceration in water, or insertion in moist earth, of branches covered with lenticels, has convinced me, like M.

Mohl, that the adventitious roots are only accidentally produced on points occupied by lenticels, and that these roots commence their appearance externally by an elevation of the epidermis, which presents the appearance of a young lenticel and is converted into a coleorhiza by the passage of the root, but that this elevation, which never becomes a suberose lenticel, is without any analogy with the lenticular elevation.

True lenticels had only been noticed on woody stems, but I have ascertained their existence not only upon some herbaceous stems, and on rhizomes or underground stems, but even on the surface of roots, both of trees and herbaceous plants (*Betula alba, Dahlia variabilis, Mirabilis Jalapa*, &c.), and frequently on the petioles of leaves (as in the Elder). Finally, I have ascertained that the rugosities which are commonly seen on the surface of the epidermis of some fruits, on the bark of Melons for example, are merely lenticels more or less deformed, and that most of the punctures which exist on the surface of Apples and Pears are lenticels incompletely formed, by the destruction of an epidermic elevation and the desiccation of the subjacent cellular tissue.

The lenticel therefore is not an organ without analogy with other known organs; in its first state it passes by insensible gradations to the epidermic productions known under the names of hairs, thorns, and glands. During the following period, after the destruction of the epidermic elevation, it is formed by the hypertrophy of the superficial cortical cellular tissue, a hypertrophy which appears to be determined by the contact of the subepidermic cellular tissue with the external air. This hypertrophy differs neither organically nor physiologically from the suberose production of the Cork Oak. The form of the hernia or lenticellar cushion is determined by the epidermic fissure which serves it as a mould; its form is usually that of a buttonhole with thick edges which throw shreds of epidermis outwards: this form resembles that of the stomata, but it appears to me that the analogy between the stomata and the lenticels is confined to this resemblance.

The physiological function of the lenticels appears to me to consist simply in causing the commencement of fissures in the epidermis. In consequence of the growth of the tree in height and diameter these fissures become long clefts, extending either in a vertical or horizontal direction, and facilitate, by loosening the bark, the increase of the diameter of the tree.